Anastomosis following low anterior resection – does one size fit all?

Low anastomosis

Dr Joshua A De Bono, BBiomedSc, MBBS1, Dr José T. Larach, MD2,3, DPhD4, Mr Joseph C Kong, MS, FRACS2,5, Mr Philip J Smart, MBBS, FRACS5, Mr Satish K Warrier, MS, FRACS1,2,4

1. Epworth Healthcare, Melbourne, Victoria, Australia
2. Division of Cancer Surgery, Peter MacCallum Cancer Centre, Melbourne
3. Department of Digestive Surgery, Pontificia Universidad Católica de Chile
4. Alfred Health, Melbourne, Victoria, Australia
5. The University of Melbourne, Parkville, Victoria, Australia
5. Austin Health, Melbourne, Victoria, Australia

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/ans.16442

Corresponding Author:
Dr Joshua A De Bono

Epworth Hospital, 89 Bridge Road, Richmond VIC Australia 3121
E-mail: jdebono1@gmail.com

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For figure legends 1 and 2 please refer to page 8 of this document. Figure separate files.

Word Count (Excluding Title Page and References): 1238
Low anterior resection with total mesorectal excision (TME) is typically performed for selected low rectal cancers as a sphincter-sparing procedure that entails supra-anal excision of the rectum followed by a low colorectal or coloanal anastomosis to re-establish fecal continence.

Several options exist for the construction of this anastomosis including an anterior rectal colonic J-pouch configuration. The most utilised is a straight end-to-end anastomosis (Figure 1). While this is often the least technically demanding for the surgeon, is it always the most appropriate?

A common sequela of sphincter preserving surgery for rectal cancer is low anal sphincter syndrome (LARS), which encompasses a constellation of symptoms including urgency, frequency, clustering and incontinence. This is in part due to a loss or reduction in distal rectal compliance post-operatively. Other factors such as radiation, surgically-induced nerve dysmotility also impact function. It has a major impact on patient quality of life: in a recent study, 45.9% of cases at 12 months. Amongst all the factors that contribute to LARS, the operative technique has a significant impact.

The proponents for an end-to-end anastomosis will argue that surgeons should have their own operative strategy, and that any functional advantage of a colonic J-pouch compared to an end-to-end anastomosis will be negligible at one year due to adaptation. However, pelvic anatomy varies widely, and in the era of personalisation of treatment, it is important to consider the patient's individual anatomy when planning surgery.
mechanism, i.e. the anorectal ring, formed by the fusion of the internal anal sphincter and puborectalis muscle. An anastomosis may be formed above the anorectal junction, and any resection below the anorectal junction will involve intersphincteric dissection.

Functional results may be improved by performing bespoke reconstruction of the anus and rectum.

The dead-space created within the pelvis following any rectal resection is a significant factor to consider when determining the type of reconstruction. Reflecting on the anatomy of surgery, the ideal reconstruction will effectively obliterate and replace a colostomy or stoma following resection with revascularised tissue. In contrast to a straight end-colon anastomosis, formation of a colonic J-pouch or side-to-end anastomosis serves dual functional advantages. The J-pouch reservoir represents a more physiological normal state in comparison to a straight end-colon anastomosis, with more effective filling of the dead-space that exists following resection. A colonic J-pouch can be formed by folding the distal colon on itself, followed by division of the septum and anastomosis using a linear stapler (Figure 1). It is limited by anatomical characteristics, such as bulky anal sphincters, insufficient colon length, obesity, and diverticulosis. In cases with a wide pelvis where anastomosis is required at, or above the anorectal junction, an anastomosis is required below the anorectal junction in the setting of short colon, and there is an inability to sufficiently mobilise the colon to construct a low anastomosis. In bulky or in the setting of a narrow pelvis, a colonic J-pouch reservoir may
For anastomoses below the anorectal junction where a long sphincter is present, a side-to-end anastomosis may be the only appropriate anastomosis. The exception to this generalization is when the inlet is narrow, but the mid rectal space is wide and colonic length is sufficient to allow for a side-to-end anastomosis. In such a scenario, Halstedian principles trump restrictions imposed by the inlet, and a colonic J-pouch is preferable. In this setting, leak consequences are potentially mitigated by a reduction in size of the pouch occupied by a reservoir. For anastomoses below the anorectal junction a hand-sewn technique is employed due to the anatomical confines limiting placement of a rigid stapling instrument above the anorectal junction, these anastomoses are by and large stapled. Techniques such as open, laparoscopic, robotic and transanal surgery. Transanal total mesorectal excision may be of use in the setting of a narrow pelvis where the standard abdominal approach is difficult.\(^9\) In this manner, a double-purse-string single-staple line, fired via staple applier.

[DELETE] Regarding an end-to-end anastomosis, the possibility of size mismatch is considered, whereby luminal diameter of the colon proximal to the resection is generally larger than that of the remaining rectum or anorectal stump. Surgically this situation is more challenging, but more importantly this may yield poor long-term outcomes due to chronic pelvic cavity causing significant morbidity if not addressed.
in this patient population, particularly considering the high incidence of LA
er 40/04 randomised controlled trial quality of life was assessed comparing rectal end anastomosis, colonic J-pouch and straight end-to-end anastomoses. New and incontinence scores were observed twenty-four months post-operatively. Analysis showed improved quality of life at the twelve-month mark for those with colonic J-pouch anastomosis when compared to an end-to-end anastomosis. Interestingly, this trial also reflected a preference for colonic J-pouch, in one third of cases randomised to colonic J-pouch surgery, alternate choice of anastomosis, perhaps influenced by a perceived fear of or due to the technical demand of colonic J-pouch formation. Surgical outcomes (mortality, reoperation, anastomotic leak, and anastomotic stricture) do not differ between any of the reconstructive techniques. The Cochrane review Rectal Resection for Rectal Cancer found formation of a colonic J-pouch into the coloanal anastomosis was associated with improved functional outcomes operatively. Postoperative complication rates were similar comparing the two anastomoses.

As a final consideration, mobility of the colon following dissection, and the mesentery can influence the fate of any low anastomosis. To facilitate a low splenic flexure is completely mobilised. High ligation of the inferior mesenteric and inferior mesenteric vein at the inferior border of the pancreas is pertinent.
In conclusion, one size does not fit all, or rather one size does not fill all with colorectal anastomosis. Careful consideration should be given to the most configuration which will best fill the pelvis. Before proceeding it is essential colon length is available to facilitate a colonic J-pouch or side-to-end anastomosis colon is then effectively mobilised to complete that anastomosis. Pelvic and habitus and height of resection should guide anastomotic technique, which term and long-term patient outcomes including anastomotic failure rates, and possibly the prevalence of LARS.
References


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Figure legends

Figure 1. Anastomosis following low anterior resection.

a) Resection, above the anorectal junction (A); at the anorectal junction (B); at the pelvic floor junction (C).

b) Straight end-to-end, double-stapled anastomosis.

c) Colonic J-pouch anastomosis.

d) Side-to-end anastomosis.

Figure 2. Flow diagram outlining factors that may influence choice of anastomosis following low anterior resection.

*In the setting of a narrow pelvic inlet but wide mid rectal space where surgery is feasible and no pouch is available, a colonic J-pouch or side-to-end reservoir should be formed.
Author/s:
De Bono, JA; Larach, JT; Singh, P; Kong, JC; Smart, PJ; Heriot, AG; Warrier, SK

Title:
Anastomosis following low anterior resection: does one size fit all?

Date:
2021-05-01

Citation:

Persistent Link:
http://hdl.handle.net/11343/298519